cleus having been completely submerged by the sea of that period. But it must have been dry land previously, since no traces of the Chazy, calciferous, and Potsdam are found beneath the Trenton, which rests directly and horizontally upon the Laurentian gneiss, and is so related to the present elevations and depressions of the gneissic surface as to indicate that they are in large part the result of erosion in pre-Cambrian times.

The reports by Messrs. Ells and Low on the Gaspé Peninsula, with the maps, indicate considerable progress in the elucidation of this small but very formidable wilderness; and Mr. Ells's notes on the geology of Prince Edward's Island prove that the so-called triassic beds of this island belong almost wholly to the Permo-carboniferous.

Prof. L. W. Bailey continues his investigation of the geology of New Brunswick in a report on Carleton and York counties, which is devoted chiefly to the Silurian and supposed Cambro-Silurian strata. The latter consist mainly of highly crystalline gneisses and schists; and the only evidence of their Cambro-Silurian age consists in the fact that they are overlain unconformably by the Silurian beds, coming between the latter and the great granite axis, by which it is supposed they have been metamorphosed.

Mr. R. Chalmers describes at considerable length the interesting glacial phenomena of the same region.
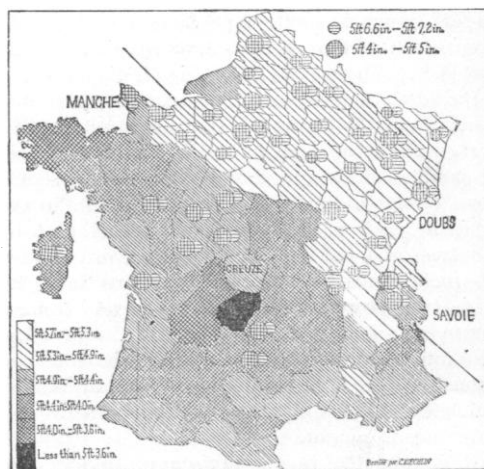
Mr. Hugh Fletcher's extended report on the northern and hitherto unsurveyed portion of Cape Breton, with the accompanying map of the whole island, places the geology of this province on a par with that of the rest of Acadia. The scale of the map, which covers 24 sheets, is entirely too liberal, being at least twice as large as either the topographic or geologic details require; and the bulkiness of the map seriously diminishes its usefulness, especially in the absence of a general map of the island on one sheet.

The remainder of the volume is made up of detailed reports on the apatite mines and deposits of Ottawa county, and the gold mines of the Lake of the Woods, and some scattering observations on the mines and minerals of Ontario, Quebec, and Nova Scotia.

HEIGHT IN FRANCE.[1]

IN the accompanying map of France the average height of the inhabitants is indicated by the shading, in which the darker shades denote the smaller, and the lighter shades the greater heights. It will be seen that a line, as shown on the map,

[1] From the *Revue scientifique*, October, 1885. By M. JACQUES BERTILLON.

running diagonally from Manche in the northwest to Savoie (Lyons) in the south-east, divides the country into two parts. To the north-east of this line the inhabitants are above the average height; to the south-west of it, below the average. This phenomenon was known to Broca, who ascribed it to racial influences alone. He held that the Celts and the Cymri mentioned by Caesar were the racial ancestors of the present French people. The Celts were of mean height, and were further distinguished by their round heads and bulging foreheads, and light hair and eyes; while the Cymri (or Belges of Caesar) were tall, and had long heads, with broad, high foreheads and light hair and eyes. Broca had also pointed out that unusual deviations from the average height were more common in those regions which we may regard as the country of the Celts, and rare among

the Cymric people. Broca prepared his map according to the frequency of the deviations from the average height, and his result is quite similar to what is obtained when, as in the present instance, the average height itself is the basis of comparison. In both cases France is divided by a line from north-west to south-east into two parts, the inhabitants of one of which are markedly taller than those of the other, while about the same regions appear as the extremes either of tallness or smallness in both cases.

It is well known that if the height of a large number of men are taken, and the number of men at each height be recorded, the largest number of records will centre about the mean height of the whole group, and the number will grow smaller as we leave the point of average height to either side. It is further known that the frequency of the records at each point of the scale is determined by

the probability curve. The applicability of this curve to the representation of height has been frequently tested, and is found always to hold wherever the conditions upon which the law depends are present; viz., that variations in the phenomenon in question be due to a large number of causes, no one of which has any great effect. Where the law does not hold in the case of a series of heights, the probability is strong that there are some influences in question which cause a considerable variation in the average height. In several parts of France there is a strong indication of the existence of two types, distinguishable by their difference in height. If we draw the curve of height for these portions, this phenomenon is evident. A good example is shown in the department Doubs. The top of the curve for this region is M-shaped, while, in dealing with a case in which the probability case does hold, — that is, when a single type is present, as in La Creuze, — the top of the curve resembles an inverted V. There exist, then, in all the provinces in the north-eastern half of France, two types which can actually be separated from each other. This is shown on the map by the occurrence of pairs of smaller circles; and the ratio of the size of these circles indicates the proportion of the two types in each part. The average height of the tall type is 5 feet 6.6 inches; of the other, 5 feet 4.6 inches. It is certainly a curious fact that these two peoples, who now have every thing in common, — language, mode of life, and all, — who intermarry freely, and probably have no consciousness of their dual origin, should still be unidentified by the constant characteristic of a difference in height.

It is probable that other circumstances than those of race can affect the stature of a people. Chief among these are, 1°, the well-being of the community; and, 2°, pathological conditions. There are countries where the average stature has changed without the introduction of a new racial element. In the low countries (Holland, etc.) this phenomenon is ascribed to the effect of the draining of the marshes, and the general betterment of the people.

The statistics of Saxony, from 1852 to 1854, make possible a comparison between the heights of the liberal and the laboring professions. If we draw the curves representing the number of each class at each height, the curve for the liberal professions shows a superiority of height throughout. They have fewer short persons, and more tall ones. The difference between the two, however (5 feet 5.6 inches and 5 feet 4.25 inches), is smaller than in the case of racial difference.

A case in which pathological influences (such as cretinism) seem to be active is offered in Switzerland. Here there seems to exist a true type of dwarfs whose heights centre about 4 feet. The suggestion that minor influences such as these may also be active in producing the differentiation of height in France, is worthy of consideration.

THE EXTRACTION OF SUGAR FROM SORGHUM AND SUGAR-CANE.

THE experiments in the application of diffusion and carbonatation to the extraction and crystallization of sugar from sorghum, which have been in progress under the direction of Dr. H. W. Wiley and his assistants at Ottawa, Kansas, during September and October, have been described by him in Bulletin No. 6 of the chemical division of the department of agriculture. The difficulties met with were largely of a mechanical nature, or resulting from the effects of early frost injuring the quality of the cane which was used for the experiment.

Of the trial on Oct. 8, Dr. Wiley says that during a run of about 21 hours, 70 cells, of about 1400 pounds of cane apiece, or 49 tons, were diffused, giving from 65 cells 96,140 pounds of juice. The exhausted chips contained less than 2 per cent of sugars, and the waste waters about the same amount; so that the extraction may be said to be nearly complete. The cost was about 80 cents per ton, and, with improvements in the mechanical details of the apparatus, labor and fuel can be saved, and the cost reduced to 30 cents. The juice drawn off stood to the cane chips in the ratio of 110 : 100 in the first, and 95.3 : 100 in the second, part of the experiments. The solids it contained varied from an average of 1.024 per cent, corresponding to a specific gravity of 1.0394 at 25° C., in the first half, to 10.55, corresponding to 1.0405 at 25° C., in the second half, of the experiment.

The juice corresponding to 15 tons of cane was defecated by the method of carbonatation, and yielded 4320 pounds of *masse cuite,* containing 77 per cent of solids, or a little more than 14 per cent of the cane worked. This, on being 'swung out,' yielded 1420 pounds, or 30 per cent of sugar well washed and dried, polarizing about 98 per cent, or at the rate of 95 pounds to the ton. The yield of second sugars would, of course, increase the rate of production per ton. Allowing 12 pounds to the gallon for the *masse cuite,* the number of gallons per ton would be 24, which is far in excess of the amount usually produced.

Dr. Wiley's general conclusions are as follows : —

1. By the process of diffusion 98 per cent of the sugar in the cane was extracted, and the yield was